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shows the results of a test run with 1000 ppm HMX in 50% acetone/50% water producing a pink color change. FIG. 15B shows the results of a test run with 1000 ppm potassium nitrate in 50% acetone/50% water producing a noticeably different orange color change.

All patents, patent applications, provisional applications, and publications referred to or cited herein are incorporated by reference in their entirety, including all figures and tables, to the extent they are not inconsistent with the explicit teachings of this specification.

It should be understood that the examples and embodiments described herein are for illustrative purposes only and that various modifications or changes in light thereof will be suggested to persons skilled in the art and are to be included within the spirit and purview of this application.

What is claimed is:

1. A paper microfluidic device (PMD), comprising:
  - a paper substrate;
  - one or more hydrophobic channels on the paper substrate; and
  - a test reagent provided at a test spot of at least one of the hydrophobic channels;
- wax on the paper substrate, said wax outlining and surrounding each hydrophobic channel of the one or more hydrophobic channels except a portion of each hydrophobic channel that receives a test sample when in use; and
- a tab protruding from the paper substrate and comprising a proximal end and a distal end opposite to the proximal end, said tab configured such that the distal end contacts a test sample when in use,
- the distal end of the tab being free from wax, and
- the test reagent being configured to test for explosives.
2. The PMD according to claim 1, comprising at least two hydrophobic channels on the paper substrate, wherein each hydrophobic channel comprises a test spot, and wherein each test spot comprises a test reagent configured to test for at least one of improvised explosives and homemade explosives.
3. The PMD according to claim 2, wherein at least two of the test spots have the same test reagent provided thereon.
4. The PMD according to claim 2, wherein a first hydrophobic channel of the at least two hydrophobic channels comprises a first test spot having a first test reagent configured to test for at least one of improvised explosives and homemade explosives,
- wherein a second hydrophobic channel of the at least two hydrophobic channels comprises a second test spot having a second test reagent configured to test for at least one of improvised explosives and homemade explosives, and

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wherein the first test reagent is different from the second test reagent.

5. The PMD according to claim 4, wherein a third hydrophobic channel of the at least two hydrophobic channels comprises a third test spot having a third test reagent configured to test for at least one of improvised explosives and homemade explosives, and wherein the third test reagent is different from the first test reagent and the second test reagent.

6. The PMD according to claim 1, comprising a main hydrophobic channel and a plurality of secondary hydrophobic channels branching off from the main hydrophobic channel, wherein each secondary hydrophobic channel comprises a test spot having a test reagent configured to test for at least one of improvised explosives and homemade explosives.

7. The PMD according to claim 1, wherein each hydrophobic channel is a wax channel, and wherein the paper substrate is filter paper or chromatography paper.

8. The PMD according to claim 1, wherein the area of the paper substrate having the one or more hydrophobic channels is less than 4.5 square centimeters (cm<sup>2</sup>).

9. The PMD according to claim 1, wherein the test reagent is a colorimetric test reagent.

10. A method of testing a sample for explosives, comprising:

providing the sample to the PMD according to claim 1.

11. The method according to claim 10, further comprising dissolving the sample in a solvent to give a sample solution, wherein providing the sample to the PMD comprises providing the sample solution to the PMD in a volume of less than 75  $\mu$ L.

12. The method according to claim 11, further comprising:

photographing the PMD after the sample solution has interacted with the test reagent to give a result image; and

transmitting the result image to a remote location.

13. The method according to claim 10, further comprising dissolving the sample in a solvent to give a sample solution, wherein providing the sample to the 3-D PMD comprises injecting the sample solution into a top layer of the 3-D PMD in a volume of less than 75  $\mu$ L.

14. The PMD according to claim 1, wherein the test reagent comprises at least one of the following: functionalized gold nanoparticles; a mixture of perchlorate reductase and N-methyl *phenazinium* sulfate; or a mixture of sulfanilic acid and N,N-dimethyl-1-naphthalene.

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